

P1547 - SCC21 Interconnection Standards Development Status

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and Industrial DG Programs Quarterly Review
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**T. Basso,
Secretary for IEEE Standards Coordinating Committee 21,
P1547, P1608, and P1614 Work Groups**



IEEE Standards Classification

1. Standards: documents with mandatory requirements **(shall)**
2. Recommended Practices: documents in which procedures and positions preferred by the IEEE are presented **(should)**
3. Guides: documents in which alternative approaches to good practice are suggested but no clear-cut recommendations are made **(may)**

Body of Standards

P1547 Standard for Interconnecting Distributed Resources with Electric Power Systems. 4/99

Guide for Network Interconnection

Guide for Grid/DG Impacts Determination

P1614 Guide for Monitoring, Information Exchange and Control of DR Interconnected with EPS (6/02)

Guide for islanding & Anti-Islanding

Interconnection System Certification Guide

P1608 Application Guide for IEEE 1547 Standard for Interconnecting Distributed Resources with Electric Power Systems. 12/01

P1589 Conformance Test Procedures for Equipment Interconnecting Distributed Resources with Electric Power System. 6/01

DG Specifications and Performance

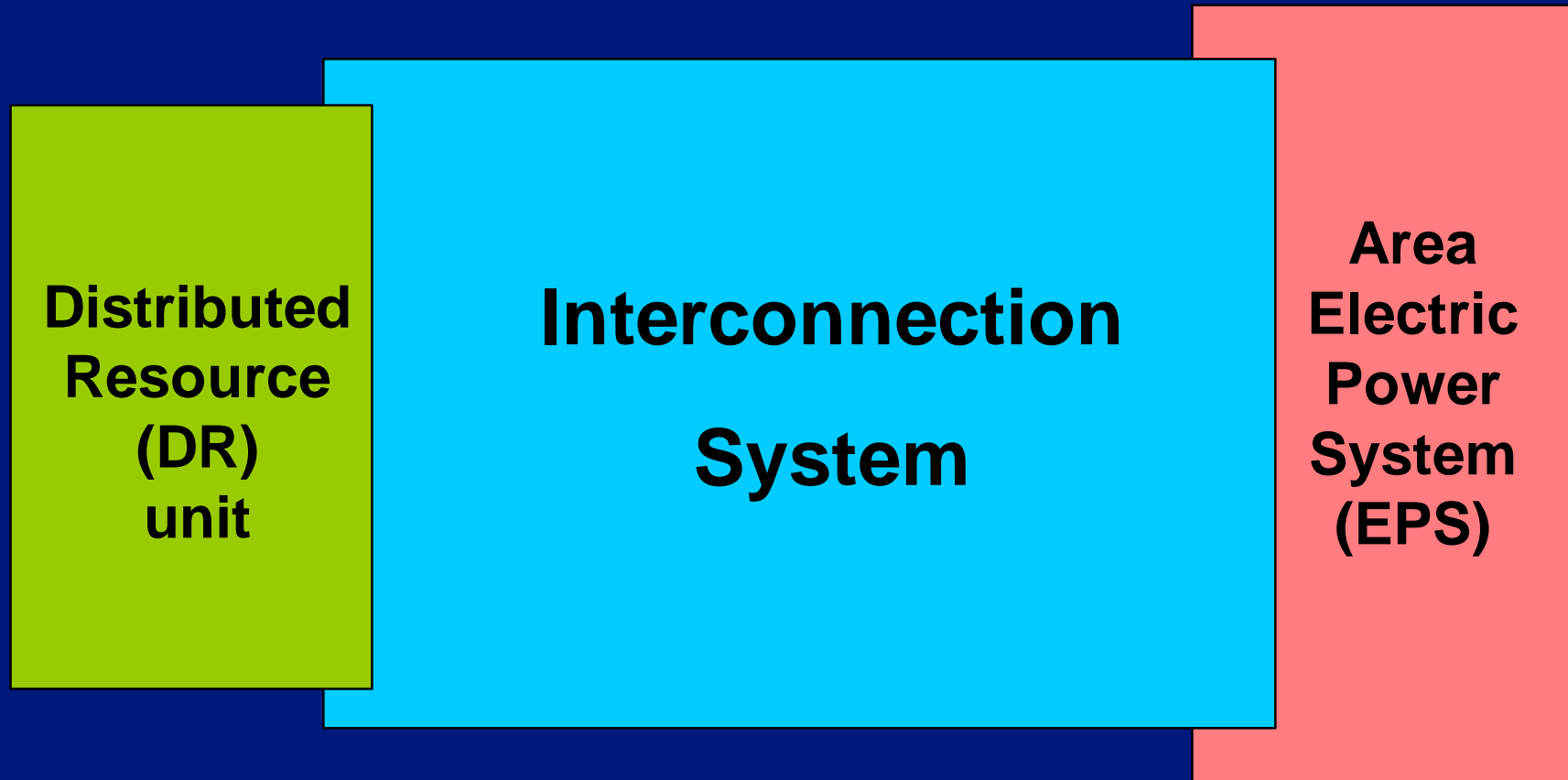
Current SCC21 Interconnection Projects

Title	Scope & Purpose
P1547 <u>Standard</u> for Interconnecting Distributed Resources with Electric Power Systems.	<ul style="list-style-type: none">• This <u>Standard</u> establishes criteria and requirements for interconnection of distributed resources (DR) with electric power systems (EPS).• This document provides a uniform standard for interconnection of distributed resources with electric power systems. It provides requirements relevant to the performance, operation, testing, safety considerations, and maintenance of the interconnection.
P1589 <u>Standard</u> for Conformance Test Procedures for Equipment Interconnecting Distributed Resources with Electric Power Systems.	<ul style="list-style-type: none">• This <u>Standard</u> specifies the type, production, and commissioning tests that shall be performed to demonstrate that interconnection functions and equipment of a distributed resource (DR) conform to IEEE Std 1547.• Interconnection equipment that connects distributed resources (DR) to an electric power system (EPS) must meet the requirements specified in IEEE Standard P1547. Standardized test procedures are necessary to establish and verify compliance with those requirements. These test procedures must provide both repeatable results, independent of test location, and flexibility to accommodate a variety of DR technologies.

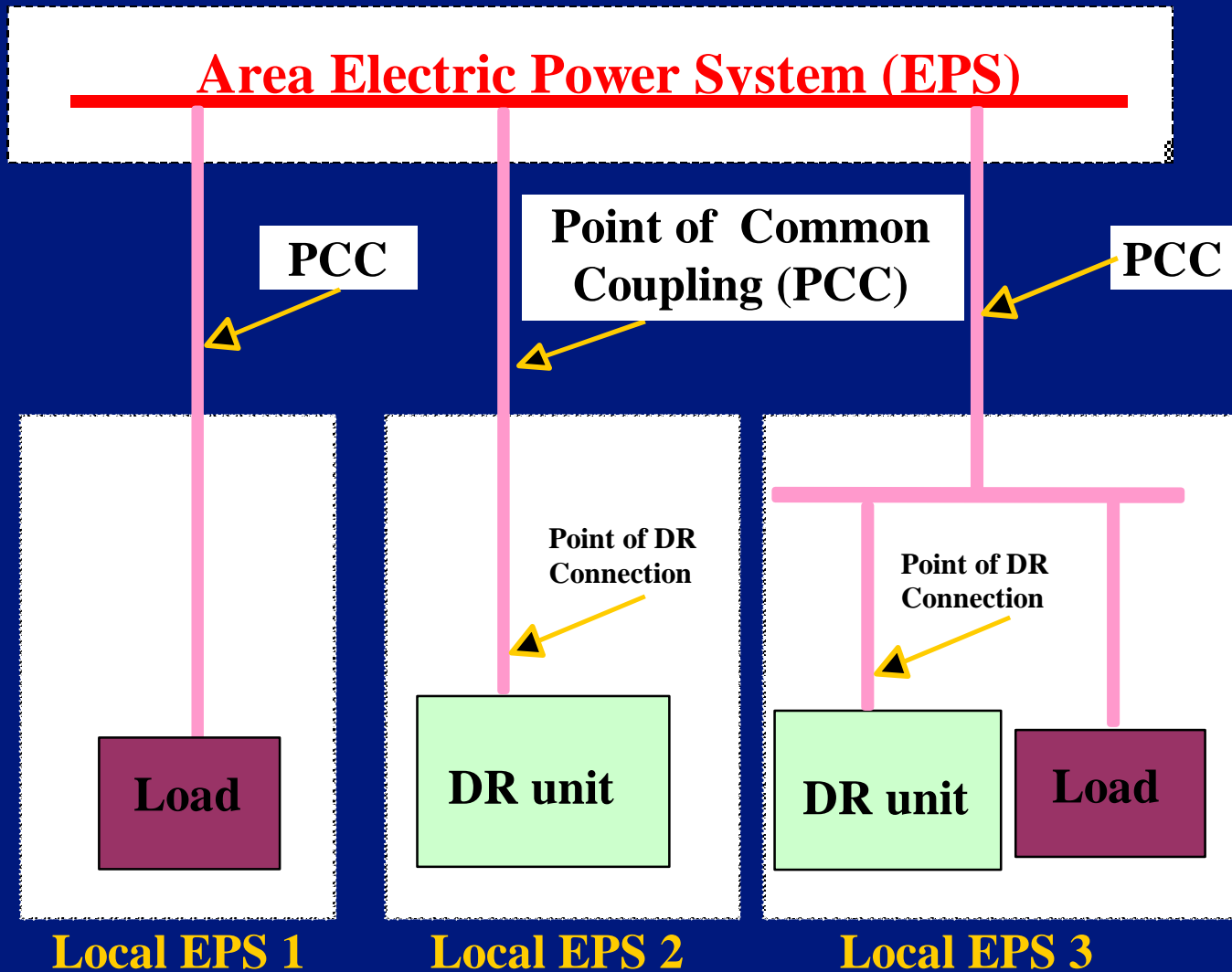
Current SCC21 Interconnection Projects

Title	Scope and Purpose
P1608 Application <u>Guide</u> for IEEE Standard 1547 for Interconnecting Distributed Resources with Electric Power Systems	<ul style="list-style-type: none">• This <u>Guide</u> provides technical background and application details to support the understanding of IEEE 1547 Standard for Interconnecting Distributed Resources with Electric Power Systems.• This document facilitates the use of IEEE 1547 by characterizing the various forms of distributed resource technologies and the associated interconnection issues. Additionally, the background and rationale of the technical requirements are discussed in terms of the operation of the distributed resource interconnection with the electric power system. Presented in the document are technical descriptions and schematics, applications guidance and interconnection examples to enhance the use of IEEE 1547.
P1614: <u>Guide</u> for Monitoring, Information Exchange and Control of Distributed Resources Interconnected with Electric Power Systems	<ul style="list-style-type: none">• This document provides guidelines for monitoring, information exchange, and control for distributed resources (DR) interconnected with electric power systems (EPS).• This document facilitates the interoperability of one or more distributed resources interconnected with electric power systems. It describes functionality, parameters and methodologies for monitoring, information exchange and control for the interconnected distributed resources with, or associated with, electric power systems. Distributed resources include systems in the areas of fuel cells, photovoltaics, wind turbines, microturbines, other distributed generators, and, distributed energy storage systems.

P1547: Interconnection Is The Focus



P1547 Interconnection Terms



Note: There can be any number of Local EPSs.

IEEE P1547 Timeline

- March 1999: IEEE Standards Board approves P1547 project
- March 2001: Completed initial ballot action (Draft 7)
 - 167 Ballot members; Too few affirmatives to move forward
 - Draft 7 reworded to Draft 8 for recirculation ballot
- October 2001: Completed ballot recirculation (Draft 8)
 - Too few affirmatives to move Draft 8 forward
- June 2002: P1547 Work Group & Writing Group Meetings
 - Expanded Writing Group presented Draft09; revised to Draft 10
- COMPLETING P1547-- July 2002 to ...
 - ✍ July –2002: Establish new ballot group
 - ✍ September 20002: complete ballot on Draft 10
 - ✍ October 2002: P1547 Work Group & Writing Group Meetings
 - Draft 10 Ballot results consideration
 - ✍ December 2002: IEEE Standards Board Meeting)

IEEE P1547 Interconnection Standard

Drafts 7 and 8 Ballot Status

Requirements for adoption: 75% ballot return, 75% affirmative

Round 1-- Draft 7

- Balloting completed 4/1/01
- 91% ballot returns
- 66% affirmative
- Addressed negative comments

<u>Voter Category</u>	<u>Affirm</u>	<u>Negative</u>
- User	30	23
- Producer	35	12
- General Interest	28	15

Round 2 -- Draft 8

- Recirculation completed 10/2/01
- 96% ballot returns
- 66% affirmative
- New Draft TBD

<u>Voter Category</u>	<u>Affirm</u>	<u>Negative</u>
- User	25	33
- Producer	43	6
- General Interest	35	14



P1547 Drafts 7 & 8 Ballot:

Some Key Issues

- **Minimum vs Maximum Requirements**
- **Field Testing vs Type Testing**
- **Secondary Grid and Spot Networks**
- **Grid/DG Monitoring and Control**
- **Voltage Regulation/Stability**
- **Grounding/Faults**
- **DG Penetration/Aggregation**



P1547 Drafts 7 & 8 Ballot:

Some Concerns

**May be addressed in a Guide (P1608)
and Not addressed in a Standard (P1547)**

- 1. EPS Impacts and Analysis (is it necessary and when)**
- 2. Penetration (ideal allowable aggregation)**
- 3. Safety (functional vs operational modes)**
- 4. Re-Fit EPS (What to do)**
- 5. Cost of EPS Re-Fit (How and Who Pays)**
- 6. Operation (which standard and who is in control)**
- 7. Reliability (operational issues – durability vs availability)**
- 8. Federal/State Implementation and Impacts (Rules)**
- 9. Misunderstanding/application (limited experience/knowledge)**
- 10. User disagreement (not all utilities and DGs are alike)**

P1547 Drafts 7 & 8 Ballot:

Working Group Broader-DER

Interconnection Concerns and Issues

1. Fully Commercialized/Certified Products
2. After Sale Service Support/Warranties
3. Liability (DG vs Grid Operators)
4. Full-Scale remote/unattended Operation (Autonomous vs Semi-Autonomous)
5. Integrated Controls & Protective Relaying (design/location)
6. Functionality of Interconnection package (always more to add)
7. Where to include the Interconnection capabilities (“black box”, generator control, etc.)
8. Interface Standards between DER and Interconnection package (equipment manufacturing design standards)
9. Issues of Scaling to different power levels
10. Lower interconnection system cost

P1547 Draft 10 Development

- Jan. 2002: Draft 8 pointed & focused review
 - ✍ Follow P1547 WG fundamental principles
 - mandatory requirements
 - universally needed for interconnection
 - technology neutral
 - aggregate size up to 10 MVA
 - ✍ Recognition that some comments and content go beyond the P1547 principles
 - ✍ Expanded Writing Group
- Feb. – May 2002: Expanded writing group held 3 meetings and established Draft 9 as mandatory requirements presented that at June 2002 P1547 meeting
- June 2002: Draft 9 presented and reviewed at P1547 meeting; Draft 10 completed by writing group
- June - July – August 2002: Draft 10 ballot documentation to IEEE



IEEE P1547/D10 Contents

INTRODUCTION

1.0 OVERVIEW

1.1 Scope

1.2 Purpose

1.3 Limitations

2.0 REFERENCES

3.0 DEFINITIONS

IEEE P1547/D10 Contents

4.0 INTERCONNECTION TECHNICAL SPECIFICATIONS AND REQUIREMENTS

4.1 General Requirements

4.2 Response to Area EPS Abnormal Conditions

4.3 Power Quality

4.4 Islanding

5.0 INTERCONNECTION TEST SPECIFICATIONS AND REQUIREMENTS

5.1 Design Test

5.2 Production Tests

5.3 Interconnection Installation Evaluation

5.4 Commissioning Tests

5.5 Periodic Interconnection Tests

ANNEX A (INFORMATIVE) BIBLIOGRAPHY

Contact Information

- **Mr. Thomas (Tom) S. Basso**
email: thomas_basso@nrel.gov
voice: (303) 275 - 3753
NREL
1617 Cole Blvd. MS-1614
Golden, CO 80401-3393
<http://www.nrel.gov>
- **IEEE SCC21 -- IEEE Standards Coordinating Committee 21 on Fuel Cells, Photovoltaics, Dispersed Generation, & Energy Storage**
<http://grouper.ieee.org/groups/scc21/>
- **P1547 Standard for Interconnecting Distributed Resources with Electric Power Systems -- web site and archives**
<http://grouper.ieee.org/groups/scc21/1547>
<http://grouper.ieee.org/groups/scc21/1547/archives/>
(scc21 web site being revised to include P1589, P1608, P1614, etc.)

